

# A Provincial Panel Data Analysis on Export Effect of China's Inbound Tourism

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## Abstract

Based on China's provincial panel data of the export, GDP, trade distance and inbound tourism income from 1997 to 2014, this study examines the export effect of inbound tourism in China, using dynamic panel data models and system GMM estimators. The empirical results for the estimations of the gravity equation demonstrate that inbound tourism promoted China's export through expanding the degree of opening to the outside world, shortening the cultural distance, "advertising effect" and "Marco Polo effect" of business tourism. Inbound tourism has a significant positive export effect, export will increase by 0.135 % when inbound tourism increases by 1%.

**Keywords:** inbound tourism, export effect, provincial panel data, system GMM

## 1. Introduction

Since the practice of reform and opening up policy, the economic and cultural communication between China and the world are rapidly enhanced, which was particularly manifested in the rapid development of the export and inbound tourism in China in the past few decades. From 1978 to 2015, China's exports of goods surged from \$9.75 billion to \$2,281.856 billion with an increase of 234 times and the average annual growth of 15.9%, and China became the largest merchandise exporter of the world in 2009. Over the same period, China's inbound tourism revenue surged from \$263 million to \$113650 million with an increase of 432 times and the average annual growth of 17.8%. What's more, International tourists of China usually came from the destination country of China's export, such as America and European countries. It seems that there may be causal relation between China's export and inbound tourism, and inbound tourism may have positive effect on export.

Inbound tourism refers to the tourism activities of residents of other countries. Besides pleasant trip of tourist, this kind of activity leads to some spill over effects, such as providing a good opportunity for tourist destination country and tourist source country to know each other better. These spill over effects can increase the capability and motive of export and the desire of import. The correlation coefficient between China's export and inbound tourism revenue reaches 0.93 is a convincing proof for close connection of inbound tourism and export. But the mechanism of export effect of inbound tourism is still undefined. It is of great theoretical and practical significance to research the export effect of China's inbound tourism and its internal mechanism in the context of China's slowdown in export.

## 2. Literature Review

The idea that there is a close link between international trade and international tourism was first proposed in 2000 by Kulendran and Wilson who found support for it by using time series econometric techniques and data for Australia and four important travel and trading partners, the USA, the UK, New Zealand and Japan. In 2001, a study using VAR model on China's data made by Jordan Shan and Kenneth Wilson showed there was a two-way cause and effect relationship between trade and tourism. Hereafter, many scholars began to focus on this subject, and their studies revealed that there is a long term balanced relationship between the inbound tourism and trade in Islamic countries(Qudair, 2004), and there is a close link between business tourism and import in Singapore(Khan, 2005). Besides, Satheesh and Russell discovered international trade had a positive effect on agricultural trade in the state of Arizona in America through research on industry level.

In China, Sun Gen Lian first focused on the relation between trade and tourism in 2008. He pointed that a close

link exists between trade and tourism, and also explained vividly that import and export is the international travel of merchandise, international tourism is the trade of traveler and funds and trade is the engines of promoting the growth of inbound tourism. His research group confirmed that the inbound tourism of China, Japan, Korea and Hongkong promoted the development of trade in 2010 and 2011. He proposed a model of 3 stages, with first stage of tourism bring trade, second stage of trade promote tourism and third stage of preference capacity limits in 2012. In addition, Liu Zhen Zhen(2009,2010) and Su Jian Jun(2013,2014) also proved that inbound tourism can promote the export effectively through their study.

As the above analysis, scholars at home and abroad made wide studies on the relation between international tourism and trade, but their studies were confined to a few counties, the study based on China's provincial panel data is a blank. What's more, most of the scholars research this subject by using descriptive statistics, correlation analysis, OLS and static model based on simple time series data, which failed to reveal the deep relation between international tourism and trade and also led to the inaccuracy of the result. Therefore, based on China's provincial panel data of the export, GDP, trade distance and inbound tourism income from 1997 to 2014, this thesis tries to analyze the export effect of the inbound tourism in China through establishing the extended gravity model of trade and using panel regression analysis method.

### 3. Research Design

#### 3.1 Research Hypothesis

There is a close link between trade and inbound tourism. Export is the international travel of merchandise and service, meanwhile, international tourism is the trade of traveler and funds. Inbound tourism can increase income of foreign exchange for countries of tourist destination, so inbound tourism becomes a part of export of service for countries of tourist destination. Therefore, this thesis divided export to merchandise export and service export. When there is no other explanation, export means the merchandise export. This thesis focuses on the positive effect of inbound tourism on merchandise export. Traditionally, early study indicates that only business tourism promoted the export, but this thesis hold a different point of view and proposes four hypothesis as follow.

The paper of Sebastian Edwards in 1993 and the paper of Ana Cuadros, Vicente Orts, & Maite Alguacil in 2004 show that the level of one country's opening up has an important effect on the export trade. If the level of one country's opening up is low, its export trade will be laggard because it lacks the chance to contact other countries, which may lead to its fail to understand the international market and lack impetus for export. Inbound tourism provides the pathway and opportunity for a country to understand the world, it also can be helpful to change the old conception and the out-dated management model, and promote the system innovation. The effect on those counties facing the transition of economic system and structure with low level of opening to the world is unbelievable magnificent. Therefore, we propose the following hypothesis:

H1: Inbound tourism promotes the export trade through enhancing one country's level of opening up to the world.

Obvious culture differences between countries can lead to the increase of trade cost, so culture gap impedes trade between countries with culture differences(Hofstede, 1983). Inbound tourism provides good chance for two sides to get acquainted with each other and understand the culture through more communication, and thus helps to bridge the culture distance. The better development of the inbound tourism, the closer relationship between different countries will establish and fewer obstacles in the trade will appear, and thus export trade can develop quickly. Therefore, we propose the following hypothesis:

H2: Inbound tourism promotes the export trade through bridging the cultural gap.

When many tourists come to china and enjoy the services from all walks of life, they are also attracted by different kinds of products, especially the Chinese characteristic products, and they automatically become the advertising audience of Chinese products. No matter what kind of motive of inbound tourists is, tourists with good economic ideas may find new business chance. Even though they can't grasp the business chance, the information of business may be spread by them and promote the development of export trade of China. Therefore, we propose the following hypothesis:

H3: Inbound tourism promotes export trade through advertisement effect.

In terms of tourism motive, international travel can be classified into business travel, leisure vacation travel, visiting relatives and friends travel and other travel. The motive of trading is contained in the business travel, for its aim is to sell or buy goods in this travel, therefore it will inevitably bring about export and import trade. As early as more than 300 years ago, Marco Polo's travel to China aiming at selling or buying goods led to the development of China's trade, which was called by some scholars as the effect of Marco Polo. Therefore, we propose the following hypothesis:

H4: Business travel promotes export trade.

### 3.2 Regression Model

In 1962, Tinbergen proposed a gravity model of trade which points out that bilateral trade flow of two countries is positively correlated with gross economy of the two countries, while negatively correlated with distance of two countries. Gravity model of trade was soon accepted as the normal form of international trade research. Through Anderson and Bergstrand's improvement on it, this model became a classic model of macro empirical research. Therefore, based on gravity model of trade, the thesis establishes econometric model to analyze the export effect of inbound tourism as follows:

$$\ln EXP_{it} = \beta_0 + \beta_1 \ln EXP_{i(t-1)} + \beta_2 \ln GDP_{it} + \beta_3 \ln DIST_i + \beta_4 \ln ITR_{it} + \varepsilon_{it}$$

Where  $EXP_{it}$  denotes the value of merchandise export in  $i$  district of China in  $t$  year,  $EXP_{i(t-1)}$  denotes the value of merchandise export in  $i$  district of China in  $t-1$  year. The first-lagged merchandise export can be treated as the proxy variable of parts of omitted variables, and it can reflect the self inertia and lasting influence of merchandise export. The first-lagged merchandise export also makes the model the typical dynamic panel model.  $GDP_{it}$  denotes the gross domestic production of  $i$  district of china in  $t$  year,  $DIST_i$  denotes the trade distance of  $i$  district of China,  $ITR_{it}$  denotes the inbound tourism flow of  $i$  district in  $t$  year,  $\varepsilon_{it}$  denotes the random disturbance term. This model is a logarithmic model, the parameters are the elastic coefficients of the explanatory variables to the dependent variables, and the logarithmic model can keep the square deviation from being too large.

### 3.3 Data and Descriptive Statistics

The data in this thesis is the panel data of the value of export trade of 31 provinces and autonomous regions of China, the gross domestic production in different area, trade distance of all provinces and autonomous regions, and inbound tourism flow of all provinces and cities from 1997 to 2014. Data of value of export trade came from the gross export of source of supply in the statistic yearbook of National Bureau of Statistics of China. Data of regional gross domestic production came from National Bureau of Statistics of China, and was changed to dollars by the RMB exchange rate. Trade distance represents as the transportation cost, so we take the railway transportation cost from all provincial cities to the export port as trade distance. To simplify the calculation, this thesis assumed the export port can be only chosen from 6 ports such as Dalian, Tianjing, Qingdao, Shanghai, Xiamen and Shenzhen, and the export port for a province is fixed according to principle of proximity. This data is from the cost calculation of transportation of China railway customer service center. We choose the exchange income of inbound tourism of all provinces as data of inbound tourism which comes from the China Tourism Statistic Annual. The inbound tourism income declined dramatically in the provinces of Jiangshu, Liaoning, and Shanxi in 2013, 2014 and 2015 due to the Statistics index was changed to the overnight travel. In order to analyze the data in a comparably stationary series, this thesis changed the data of the 3 provinces according to the growing rate of the income of the national inbound tourism. The main description of the variable is as table 1.

Table 1. Variable descriptive statistics

variable	N	Mean	Std.Dev.	Min	Max
logexport	558	8.68487	1.883126	3.125444	13.52155
loggdp	558	11.08483	1.319071	6.837062	13.91435
logdist	558	7.738656	2.114316	0	9.49865
logitr	558	5.75115	1.786652	-.1743534	9.747206

This thesis draw a scatter diagram of logarithm of export trade and logarithm of inbound tourism income. According to figure 1, an apparent positive relation between inbound tourism and export trade shows inbound tourism may have a positive effect on export trade. But the relationship between china's inbound tourism and export trade needs further verification for the reason that other explaining variables of the model, individual effect of different provinces and cities, as well as the endogenous relations of variables are not taken into account in the scatter Figure.

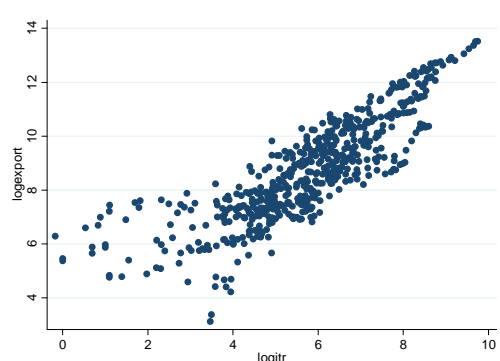


Figure 1. Scatter diagram of china’s export and inbound tourism

**4. Empirical Analysis**

*4.1 Research Method*

In order to solve the endogenous problem, a first-lagged of merchandise export will be added to the explanatory variables as the proxy variable of parts of omitted variables, which is able to reflect the self inertia and makes the model the typical dynamic panel model. Dynamic panel model can be estimated by DIF-GMM method and system GMM method. Estimator of DIF-GMM employs the lagged variable of level-value as instrumental variable, while estimator of system GMM adopts the lagged variable of difference variables as the instrumental variables of level-value, which adds available instrumental variables. For the instrumental variables of DIF-GMM are tend to be weak instrumental variables, and first order difference equation will abandon none time-varying variables, so the difference equation can’t get the estimated coefficient of trade distance. System GMM assumes difference variables are uncorrelated with fixed effect and can separate the none time-varying variables from residual on the condition that the moment condition of identification equation will not be influenced, so it can estimate the parameter of trade distance which does not vary with the time in this model. Therefore, this thesis mainly adopt Stata software and system GMM in estimating the model and will compare with the regression result of other ways of estimation. Whether difference of disturbing term is serial correlated and instrumental variable is over-identifying need to be checked in order to guarantee the consistency and validity of the result of parameter estimation when system GMM is adopted to estimate the model. The results of auto correlation test of first order difference and second order difference and sargan test will be respectively attached to the latter part in the thesis.

*4.2 Test of Cointegration*

Panel data may cause false regression because of non-stationary of the data, so this thesis firstly tests the stationary of the panel data. Given the panel data does not have unit root, it is stationary panel data, and the model can be estimated directly. If panel data is non-stationary, data needs to be cointegrated, or the model needs to be adjusted before estimation.

The main ways of unit root test of panel data are LLC(Levin-Lin-Chu Test), IPS(Im-Pesaran-Shin Test), HT(Harris-Tzavalis Test), Breitung and Fisher-PP. This thesis proceeds the unit root test and results of test of all variables and their first order difference are in the table 2.

Table 2. Results of unit root test of all variables and their first order difference

variable		logexport	loggdp	logitr	D.logexport	D.loggdp	D.logitr
LLC	statistic	-2.6467	0.4614	-1.0727	-10.9945	-3.2566	-8.8342
	P value	0.0041	0.6777	0.1417	0.0000	0.0006	0.0000
IPS	statistic	7.0225	17.4404	5.5264	-10.4625	-4.8602	-11.5848
	P value	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000
HT	statistic	0.9761	1.0202	0.9396	-0.1115	0.4603	-0.2677
	P value	1.0000	1.0000	0.9996	0.0000	0.0000	0.0000
Breitung	statistic	10.0666	17.7103	8.3713	-9.4456	-7.0623	-10.5363

	P value	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000
Fisher-PP	statistic	-4.1560	-5.4838	-3.7570	34.5181	5.2022	47.1619
	P value	1.0000	1.0000	0.9999	0.0000	0.0000	0.0000

According to table 2, value of export, gross domestic production and income of inbound tourism in different districts are non-stationary because they have unit root, while the first order difference of these variables are stationary because they have no unit root, so they are integrated of order 1. The data of first order integration can regress properly only when they pass cointegration test. So, this thesis adopts the way of panel cointegration test based on error correction proposed by Westerlund(2007) to check all variables and discover that there is cointegration relationship between explained variables and explaining variable. That means model regression can be proceeded. The result of cointegration test is showed in table 3.

Table 3. Result of cointegration test

Statistic	Value	Z-value	P-value	Robust P-value
Gt	-2.926	-6.616	0.000	0.000
Ga	-4.642	2.824	0.998	0.000
Pt	-12.455	-3.909	0.000	0.000
Pa	-4.955	-0.604	0.273	0.000

#### 4.3 Regression Analysis

This thesis first estimates the model without first-lagged explained variable through the ways of pooled OLS regression, fixed effect and random effect. Fixed effect model is required to be employed because of the result of F test, BPLM test and hausman test. Later the model with first-lagged explained variable will be estimated through the ways of pooled OLS regression, fixed effect and system GMM, and at last the model is estimated with the annual fixed effect by system GMM. The regression result of the model is as table 4.

Table 4. Regression result of the model (explained variable: logexport)

explaining variables	Regress 1 POLs	Regress 2 FE+Robust	Regress 3 POLs	Regress 4 FE+Robust	Regress 5 sysGMM	Regress 6 sysGMM+Year
L.logexport			0.959*** (0.0133)	0.805*** (0.0294)	0.660*** (0.0127)	0.712*** (0.211)
loggdp	0.853*** (0.0818)	0.840*** (0.0892)	0.0302* (0.0160)	0.148*** (0.0381)	0.246*** (0.0118)	0.275 (0.254)
logdist	-0.179*** (0.0335)		-0.00365 (0.00284)		-0.142*** (0.0307)	-0.0412 (0.106)
logitr	0.325** (0.128)	0.197** (0.0893)	0.0196 (0.0127)	0.0561** (0.0254)	0.135*** (0.00829)	0.0498* (0.0300)
Constant	-1.252** (0.529)	-1.756** (0.655)	0.0778 (0.107)	-0.151 (0.180)	0.656** (0.258)	-0.475 (0.665)
AR(1)					0.0014	0.6767
AR(2)					0.8461	0.8705
Sargan					0.4284	0.9877
R-squared	0.873	0.867	0.986	0.945		
N	558	558	527	527	527	527
region		31		31	31	31

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

According to table 4, six regression results are consistent with the theory and practice because regression shows

that export is negative correlation with trade distance and positive correlation with other explaining variables. The estimating results of most coefficients are significant and the coefficient of determination is much larger, which prove fitting degree of the model is comparable higher. Coefficient of determination of regression 3 and regression 4 is larger than that of regression 1 and regression 2, but the estimating result of the coefficient is too smaller and not significant, so it is not fit to estimate the dynamic panel data through ways of pooled OLS and fixed effect. The system GMM method adopted in regression 5 is the most suitable estimating way for the dynamic panel model of this thesis because most coefficient estimators are not significant in regression 6 which adds the annual fixed effect. Besides, result of regression 5 reveals that there is the first order auto-correlation but no second order of auto-correlation in the difference of disturbing term, so the original hypothesis of no auto-correlation of disturbing term is accepted. Meanwhile the assumption of the validity of all the instrumental variables can not be rejected in the Sargan test, so system GMM can be employed.

In regression 5 the coefficient of lagged export is 0.66, which reveals 1% rise in export will bring about 0.66% rise in export of next year and means that China's export has large inertia and lasting influence. Coefficient of gross domestic production is 0.246, and that of trade distance is -0.142, which explains that 1% rise of GDP and trade distance of every district causes the change of 0.246% and -0.142% in the export, which is correspondent with the assumption of gravity model.

Coefficient of inbound tourism is 0.135 and the estimator is significant, which means that 1% rise of inbound tourism leads to 0.135% rise in export. From the above analysis, it can reach to the conclusion that inbound tourism has apparently positive export effect, and thus promoting inbound tourism through enhancing the competitiveness in international tourism can help to accelerate the development of China's export.

## 5. Conclusion and Suggestion

### 5.1 Research Conclusion

Through literature review and analysis, this thesis proves the hypothesis that inbound tourism can promote export through further boosting the degree of opening up, shortening culture distance, advertisement effect and Moco polo effect of business tourism is valid. , And then this thesis examines the export effect of inbound tourism in China, using dynamic panel data models and system GMM estimators, based on China's provincial panel data of the export, GDP, trade distance and inbound tourism income from 1997 to 2014. The research discovers that every 1% rise in inbound tourism will lead to the 0.135% increase in export, and thus inbound tourism has positive export effect.

This paper enrich the research of export effect of inbound tourism through proposing the mechanism and extending the study to the regional panel level. But this paper didn't discuss the difference effect between China's provinces and reasons which will be the direction for future research.

### 5.2 Suggestion

Based on the above empirical study, some advice are proposed as follows: first, promoting the merchandise export through developing inbound tourism. Inbound tourism is service export itself and also a force to develop the merchandise export, therefore this positive effect should be put into full play when the export in China face the trend of decline. Secondly, improve service quality of inbound tourism and international competitiveness. Since the policy of opening to the world was put into practice, the development of China's merchandise export mainly depends on low cost and large scale with extreme low additional values, so foreigners get little knowledge about the connotation of history and culture and the significance of brand behind of the goods. Inbound tourism of high quality can help to propagandize China's image and the culture of China's goods, promote the soft power of China's export and add its additional value, and thus improve the quality of China's export.

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